WHAT IS CLAIMED IS:

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1.   A method for communicating packets between one of a plurality of
sending nodes and one of a plurality of receiving nodes of a switched network, the
switched network including a buffer-less switch coupling the sending nodes and the
receiving nodes, the method comprising:
  transmitting packets from respective sending nodes to respective input ports of
    the buffer-less switch; and
  forwarding all packets that are successfully delivered through output ports of
    the buffer-less switch to the receiving nodes, through the buffer-less
    switch with a fixed forwarding rate.

2.   The method as recited in claim 1 wherein each receiving node sends an
acknowledge to a respective sending node at a predetermined time with respect to
sending a corresponding packet, to indicate successful delivery of the corresponding
packet to the sending node, thereby providing a fixed time for the sending node to
know whether a packet was successfully transmitted.

3.   The method as recited in claim 2 wherein the sending node determines
that transmission of a packet was unsuccessful by checking if the acknowledge was
returned after the predetermined time has elapsed.

4.   The method as recited in claim 3 wherein the receiving node sends a
no acknowledge (nack) at the predetermined time to the sending node on detection of
an error condition in receipt of the packet.

5.   The method as recited in claim 4 wherein the error condition detected
by the receiving node is one of a buffer overflow and a checksum error.

6.   The method as recited in claim 2 wherein unsuccessful transmission
is determined by a timeout indicating that an acknowledge failed to arrive after the
predetermined time has elapsed.

7.   The method as recited in claim 1 further comprising:

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2   for each packet being sent over the switched network, requesting respective

3   transmission paths through the switched network to one of the

4   receiving nodes;

5   allocating one of the transmission paths to a first requester with respect to

6   arrival time in the buffer-less switch, the first requester requesting the

7   one transmission path, and ignoring any other requests for the one

8   transmission path until the one transmission path again becomes

9   available; and

10   if multiple requests collide by requesting a switch resource simultaneously,

11   selecting a first packet associated with one of the requests as a winning

12   packet and dropping any other packets associated with requests other

13   than the one request.

1   8.   The method as recited in claim 7 wherein the requests for transmission

2   paths are contained within the packets sent into the network and extracted after entry

3   into the switch.

1   9.   The method as recited in claim 7 further comprising selecting the

2   winning packet according to at least one of a random basis and a round robin basis.

1   10.   The method as recited in claim 7 further comprising selecting the

2   winning packet according to a fairness criteria having an objective to allocate to each

3   input port an equal share of bandwidth at each output port.

1   11.   The method as recited in claim 7, wherein no buffer space is allocated

2   in a receiving node before a packet is sent, thereby simplifying switch overhead.

1   12.   The method as recited in claim 11 wherein if the receiving node detects

2   a buffer overflow, the receiving node sends a no acknowledge packet (nack) to the

3   sending node indicating that a packet associated with the buffer overflow was not

4   successfully received.

1   13.   The method as recited in claim 1 wherein communicating packets

2   between one of the sending nodes and one of the receiving nodes further comprises:

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3 the sending node writing a packet to a send register;

4 the sending node polling a status register to determine if transmission of the

5 packet was successful; and

6 if transmission was unsuccessful rewriting the packet to the send register.

1 14. A method for utilizing a switch of a switched network comprising:

2 forwarding packets at a fixed rate on a first come first served basis from

3 respective input ports through the switch to respective output ports;

4 and

5 if a first and second packet simultaneously request a switch resource, selecting

6 one of the first and second packets a winner and one a loser, the winner

7 obtaining the switch resource, and dropping the loser.

1 15. The method as recited in claim 14 wherein the selecting is determined

2 according to at least one of a random selection and a round robin selection.

1 16. The method as recited in claim 14 wherein low latency packets are

2 transmitted on the switch.

1 17. The method as recited in claim 14 wherein a sending node can

2 positively determine after a fixed delay with respect to sending of the packet that a

3 packet was successfully transmitted across the switched network.

1 18. A computing system comprising:

2 a plurality of sending and receiving nodes;

3 a low latency switched network including a first switch, the first switch being

4 a buffer-less switch coupling the plurality of sending and receiving

5 nodes, the buffer-less switch having a fixed forwarding delay for all

6 packets sent from one of the sending nodes and successfully received

7 by one of the receiving nodes.

1 19. The computing system as recited in claim 18 further comprising a

2 second switched network including a second switch coupled to the plurality of

3 sending and receiving nodes.

1   20.   The computing system as recited in claim 18 wherein the first switch
2   carries scheduling information for a storage device and the second switch carries bulk
3   traffic for at least one of storage and retrieval on the storage device.

1   21.   The computing system as recited in claim 18 wherein each sending
2   node includes a send register written into by a sending node to send data across the
3   network.

1   22.   The computing system as recited in claim 21 wherein each sending
2   node includes a status register indicating whether a transfer across the network
3   completed successfully.

1   23.   The computing system as recited in claim 22 wherein the status
2   register includes a field indicating a type of failure.

1   24.   The computing system as recited in claim 22 wherein a sending node
2   rewrites data into the send register if a transfer across the network for the data
3   completed unsuccessfully.

1   25.   The computing system as recited in claim 18 wherein the buffer-less
2   switch further comprises:
3   a plurality of input registers coupled to respective input ports;
4   switch control logic, coupled to the input registers and responsive to packet
5   information stored in the registers, to allocate output ports on the
6   switch according to the packet information;
7   and wherein the switch control logic is responsive to allocate output ports on a
8   first come first served basis.

1   26.   The computing system as recited in claim 25 wherein respective packet
2   information provided to the switch control logic constitutes respective requests for
3   output ports, and if a first and second request for an output port path collide by
4   requesting the output port at the same time, the switch control logic responds by

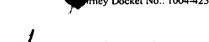5   selecting one of the requests as a winner and dropping a packet associated with the

6   second request.

1   27.   The computing system as recited in claim 25 further comprising output

2   registers in the buffer-less switch coupled to receive data selected by respective

3   selector circuits selectively coupled to respective ones of the input ports.

1   28.   The computing system as recited in claim 26 wherein the switch

2   control logic selects the winner according to at least one of a random basis and a

3   round robin basis.

1   29.   The computing system as recited in claim 18 wherein the low latency

2   switched network includes a plurality of cascaded buffer-less switches, thereby

3   forming a multi-stage buffer-less switch.

1   30.   A switched network comprising:

2   means for forwarding packets ports at a fixed rate on a first come first served

3   basis from respective input ports through the switch to respective

4   output ports; and

5   means for selecting one of a first and second packet as a winner and one a

6   loser, the winner obtaining a switch resource, and dropping the loser, if

7   the first and second packet simultaneously request the switch resource.